

## II B.Tech I Semester Regular Examinations, December-2024

R23

Sub Code: R23CC2101

DISCRETE MATHEMATICS & GRAPH THEORY

Time: 3 hours

(CSE, IT, CSE(AIML), AI, AIML, DS, CYS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

### PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define tautology.	1	1	2M
	b	Show that $P \wedge (Q \wedge R)$ and $(P \wedge Q) \wedge R$ are logically equivalent.	1	1	2M
	c	Define about finite and infinite sets.	1	2	2M
	d	Define Power set. If $S = \{a, b, c\}$ then $P(S)$ is?	1	2	2M
	e	In how many ways can 20 similar books be placed on 5 different shelves	2	3	2M
	f	Explain general solution and particular solution of recurrence relation	2	3	2M
	g	Illustrate the advantages of Matrix representation of graph.	2	4	2M
	h	Explain Hamiltonian graph with example	2	4	2M
	i	Explain multi graph with example	2	5	2M
	j	Define planar graphs with examples	1	5	2M

### PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2	Unit-I				
	a	i) Check whether the following statements is a tautology or not $(\sim P \wedge (P \wedge Q)) \rightarrow \sim Q$	3	1	5M
		ii) Write each of the following statements in symbolic form	3	1	5M
		*) Anil & Sunil are rich. *) Neither Ramu nor Raju is poor. *) It is not true that Ravi & Raju are both rich.			
OR					
b	i) Prove or disprove the validity of the following arguments using the rules of inference.	3	1	5M	
	*) All men are fallible *) All kings are men *) Therefore, all kings are fallible				
	ii) Obtain PDNF of following: $(\sim P) \vee Q$	3	1	5M	
3	Unit-II				
	a	i) Draw the Hasse diagram for the partial ordering $\{(A,B)   A \subseteq B\}$ on the power set $P(S)$ , where $S = \{a,b,c\}$ .	2	2	5M
	ii) If $A = \{1,2,3,4\}$ and $R, S$ are relations on $A$ defined by $R = \{(1,2), (1,3), (2,4), (4,4)\}$ $S = \{(1,1), (1,2), (1,3), (1,4), (2,3), (2,4)\}$ find $R \circ S, S \circ R, R \circ R, S \circ S$ , write down there matrices.	2	2	5M	

		OR		
b	i) Verify the following relation R on $X = \{1, 2, 3, 4\}$ is an equivalence relation or not? Given $R = \{(1, 1), (1, 4), (4, 1), (2, 2), (2, 3), (3, 4), (3, 3), (3, 2), (4, 3), (4, 4)\}$ .	2	2	5M
	ii) Let $X = \{1, 2, 3, 4\}$ and a mapping $f: X \rightarrow X$ be given by $f = \{(1, 2), (2, 3), (3, 4), (4, 1)\}$ . Find the composition function $f^2, f^3$ and $f^4$ . Where $f^2 = f \circ f$	2	2	5M
Unit-III				
a	i) In how many ways can four students be selected out of twelve students if two particular students are not included at all?	2	3	5M
	ii) Define Generating function and explain the operations on generating functions?	2	3	5M
OR				
b	i) A women has 20 close relatives and she wishes to invite 7 of them to dinner. In how many ways she can invite Two particular persons will not attend together.	2	3	5M
	ii) Find the particular solution of the recurrence relation $a_{n+2} - 4a_{n+1} + 4a_n = 2^n$ .	2	3	5M
Unit-IV				
a	i) Define isomorphism? And explain isomorphism with suitable example.	2	4	5M
	ii) Define Eulerian circuit and Hamiltonian circuit, give an example of graph that has neither an Eulerian circuit nor Hamiltonian circuit.	3	4	5M
OR				
b	i) Explain properties of adjacency matrix by taking suitable graph with minimum 4 nodes 6 edges.	2	4	5M
	ii) Define Walk, Trail, Paths and circuit? Explain with suitable graphs examples.	2	4	5M
Unit-V				
a	i) Explain in brief about Eulers Theorem with Example?	2	5	5M
	ii) Define spanning tree of a graph, and explain DFS algorithm to find spanning tree of a graph with suitable example?	2	5	5M
OR				
b	i) Show that in a connected planar graph G with n vertices and m edges has regions $r = m - n + 2$ in every one of its diagram?	3	5	5M
	ii) Explain kruskal's algorithm to find minimal spanning tree of the graph with suitable example?	2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

\*\*\*

## II B.Tech I Semester Regular Examinations, December-2024

Sub Code: R23CC2102

### UNIVERSAL HUMAN VALUES

Time: 3 hours.

(COMMON TO ALL BRANCHES)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

### PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Describe the value education.	2	1	2M
	b	Differentiate between happiness and prosperity.	2	1	2M
	c	Define the concept of harmony in the human being.	1	2	2M
	d	Interpret the harmony in the self.	2	2	2M
	e	Describe the harmony in the family.	2	3	2M
	f	Differentiate between 'trust' and 'respect'.	2	3	2M
	g	List the four orders of nature.	2	4	2M
	h	Interpret the interconnectedness in nature	2	4	2M
	i	Define the term definitiveness of ethical human conduct.	1	5	2M
	j	Describe the natural acceptance.	2	5	2M

### PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No		Questions	KL	CO	M	
2	Unit-I					
	a	i) Explain the role of education in achieving holistic development.	2	1	5M	
		ii) Outline the method to fulfill basic human aspirations.	2	1	5M	
	OR					
	b	i) List the basic components of holistic development.	2	1	5M	
		ii) Explain the current scenario concerning happiness and prosperity in society.	2	1	5M	
3	Unit-II					
	a	i) Explain the co-existence of the self and the body.	2	2	5M	
		ii) How do the needs of the self differ from the needs of the body?	2	2	5M	
	OR					
	b	i) Briefly explain the role of health in ensuring harmony in the human being.	2	2	5M	
		ii) Discuss the key components of a programme for self-regulation?	2	2	5M	
4	Unit-III					
	a	i) Explain the significance of 'trust' as a foundational value in relationships.	2	3	5M	
		ii) Explain why harmony in the family is considered the basic unit of human interaction.	2	3	5M	

OR					
b	i) Explain the importance of harmony in society for the well-being of individuals.	2	3	5M	
	ii) Mention two examples of other feelings that contribute to harmonious relationships.	2	3	5M	
Unit-IV					
5	a	i) Explain the concept of self-regulation in the four orders of nature.	2	4	5M
		ii) Explain the relationship between interconnectedness and coexistence.	2	4	5M
OR					
b	i) Explain the significance of coexistence in realizing existence	2	4	5M	
	ii) How does nature achieve self-regulation without external intervention?	2	4	5M	
Unit-V					
6	a	i) Explain the significance of humanistic education in shaping individual behavior.	2	5	5M
		ii) Discuss the main features of value-based management models.	2	5	5M
OR					
b	i) Outline any one strategy for transitioning toward a value-based profession.	1	5	5M	
	ii) How does a humanistic constitution contribute to a universal human order?	2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

\*\*\*

**II B.Tech I Semester Regular Examinations, December-2024**

**R23**

**Sub Code: R23CC2103 DIGITAL LOGIC & COMPUTER ORGANIZATION**

Time: 3 hours

(CSE, IT,CS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

**PART-A**

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a Identify the names of Basic gates and Universal gates.	1	1	2M
	b Sketch the block diagram of 4X1 Multiplexer.	3	1	2M
	c Define Sequential circuit and what is the use of D-Flipflop.	1	2	2M
	d Explain the purpose of ALU.	4	2	2M
	e Illustrate how computer performs subtraction over two signed numbers.	4	3	2M
	f Distinguish between Hard-wired and Micro-programmed control units.	4	3	2M
	g Define cache hit and cache miss.	1	4	2M
	h Interpret the use of primary memory.	1	4	2M
	i Define what is an Interrupt.	1	5	2M
	j Explain what is Synchronous bus.	4	5	2M

**PART-B**

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M
2	Unit-I			
	a i) Determine decimal, octal and hexadecimal equivalents of the given binary number 10111101100110.01011(2).	3	1	5M
	ii) Explain fixed point representation and Floating-point representation.	4	1	5M
	OR			
b	i) Implement K-map to minimize the given function $f(A,B,C,D) = \sum m(0,1,2,4,5,7,8,9,10,12,14) + \sum d(3,6,11)$	3	1	5M
	ii) Explain what is a combinational circuit and explain the working of Decoder with neat diagram.	4	1	5M
3	Unit-II			
	a i) Sketch all the types of Flip-Flops.	3	2	5M
	ii) Explain Shift Register with neat diagram.	4	2	5M
	OR			
b	i) Explain all the functional parts of the micro-computer.	4	2	5M
	ii) Explain Von-Neumann Architecture.	4	2	5M
4	Unit-III			
	a i) Sketch the flowchart for Addition and Subtraction of Signed Numbers.	3	3	5M
	ii) Explain Booth's Multiplication Algorithm with neat diagram.	4	3	5M

b	OR				
	i) Explain Instruction Cycle with neat diagram.	4	3	5M	
	ii) Explain Microprogrammed control unit with neat diagram briefly.	4	3	5M	
5.	Unit-IV				
	a i) Categorize different types of Secondary storage devices and explain.	4	4	5M	
	ii) Sketch the block diagrams of RAM and ROM and explain.	3	4	5M	
	OR				
b	Explain different Cache memory mapping techniques.	4	4	10M	
6	Unit-V				
	a	Explain Priority Interrupt Controller with neat diagrams.	4	5	10M
	OR				
b	Interpret Direct Memory Access Data Transfer with neat diagrams.	2	5	10M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

## II B.Tech I Semester Regular Examinations, December-2024

Sub Code: R23CC2104

ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS

Time: 3 hours

(CSE, IT, CSE(AIML), AI, AIML,DS, CYS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

### PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a Compare the different algorithmic complexities notations.	1	1	2M
	b Define self balancing trees	1	1	2M
	c Differentiate between connected and bi connected components	1	2	2M
	d Find total number of comparisons made in quick sort for sorting a file of size n.	2	2	2M
	e Write the control abstraction of Divide and Conquer method	1	3	2M
	f Summarize feasible and optimal solution.	1	3	2M
	g What are tractable and non-tractable problems?	1	4	2M
	h Discuss the principle of backtracking.	2	4	2M
	i What does NP-hard mean? State approximation algorithm for NP hard problem.	1	5	2M
	j State the subset sum problem.	1	5	2M

**PART-B: Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)**

Q.No	Questions	KL	CO	M	
2	Unit-I				
	a	i) How can we find the time complexity of an Algorithm? Explain with example?	2	1	5M
		ii) Suppose $T1(n)$ is $W(f(n))$ and $T2(n)$ is $W(g(n))$ . Which of the following statements are true?	3	1	5M
		i. $T1(n) + T2(n)$ is $W(\max(f(n), g(n)))$ .			
		ii. $T1(n)T2(n)$ is $W(f(n)g(n))$ .			
	Some authors define big omega by saying $f(n)$ is $W(g(n))$ if there is some $n_0$ and $c > 0$ such that for all $n \geq n_0$ we have $f(n) \geq cg(n)$ .				
	OR				
	b i) Explain AVL tree and perform LL,RR,LR and RL rotations on sample data	2	1	10M	
3	Unit-II				
	a	(a) i) Explain the Properties of Min Heap and Max Heap	2	2	4M
		ii) Explain why there are no forward Non-tree edges with respect to a BFS tree constructed for a directed graph. Explain with one example graph.	2	2	6M
		OR			
		b i) How quickly can you multiply a $kn \times n$ matrix by an $n \times kn$ matrix, using Strassen's algorithm as a subroutine? Answer the same question with the order of the input matrices reversed.	3	2	5M
	ii) Apply Quick sort on a given sequence 7 11 14 6 9 4 3 12. What is the sequence after first phase, pivot is first element?	3	2	5M	

Unit-III

i) Construct job sequencing schedule for  $n=7$ ,  $(p_1, p_2, p_3, p_4, p_5, p_6, p_7) = (100, 10, 15, 27, 120, 55, 40)$  and deadlines  $(d_1, d_2, d_3, d_4) = (2, 1, 2, 1, 4, 3, 1)$ .

3

3

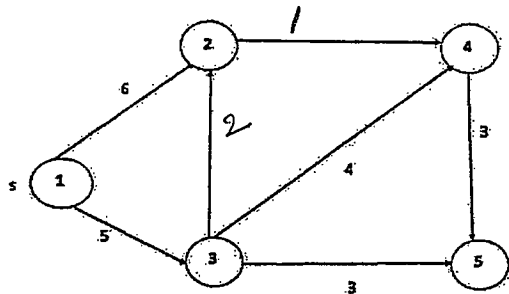
5M

ii) Find the below directed graph. Consider the node 0 as source node and find the single shortest paths to remaining vertices.

3

3

5M



OR

i) Explain how dynamic program is efficient than greedy method.

2

3

5M

ii) Plan the following instance of the 0/1, knapsack problem given the knapsack capacity in  $W=5$  using dynamic programming and explain it.

3

3

5M

Item	Weight	Value
1	4	10
2	3	20
3	2	15
4	5	25

Unit-IV

i) The N-queens problem is to place n-queens on an  $n \times n$  chess board. What are the constraints in placing n-queens? Explain how backtracking can be used to solve the problem.

3

4

5M

ii) Draw the state space tree for  $n=3$  and  $m=3$  colors.

3

4

5M

OR

i) Draw the portion of State space tree generated by LCBB for the knapsack problem of the instance  $N = 5$ ,  $(p_1, p_2, \dots, p_5) = (13, 15, 7, 2, 4)$ ,  $(w_1, w_2, \dots, w_5) = (4, 6, 3, 4, 2)$  and  $m = 12$  by using fixed tuple size information.

3

4

10M

Unit-V

i) Describe the Clique Decision Problem(CDP).

2

5

10M

OR

i) Explain about Non-deterministic algorithms. Provide the examples for P and NP algorithms.

2

5

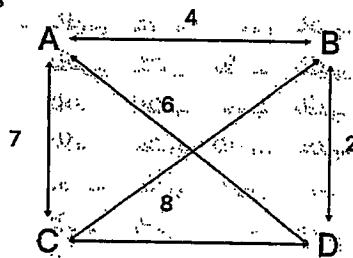
5M

ii) Solve the following Travelling Sales person problem.

3

5

5M



KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks



# NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

## II B.Tech I Semester Regular Examinations, December-2024

Sub Code: R23CC2105

**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**

Time: 3 hours

(CSE, IT, CSE(AIML), AI, AIML,DS, CYS)

Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

### PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No	Questions	KL	CO	M
1	a Differentiate break and continue statements.	2	1	2M
	b Compare the Relational Operators and Boolean Logical Operators.	2	1	2M
	c What do you mean by Object? Define class.	1	2	2M
	d How is an argument passed to a method? Can the argument have the same name as its parameter?	1	2	2M
	e When is the memory allocated for an array?	1	3	2M
	f Define the keywords private and protected.	1	3	2M
	g What do you understand by inner class?	1	4	2M
	h Write the importance of finally block.	1	4	2M
	i List all File Stream classes	1	5	2M
	j What is Thread Life Cycle?	1	5	2M

### PART-B: Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q.No	Questions	KL	CO	M	
2	Unit-I				
	a	i) Explain in detail about the different features of Object Oriented Programming.	1	1	5M
		ii) Explain and write Java Program to find the largest of three numbers using Ternary Operator and smallest of three numbers using Ternary Operator.	3	1	5M
	OR				
	b	i) List out the decision making statements available in Java. Explain with example.	1	1	5M
		ii) Write a program that reads an integer between 0 and 1000 and adds all the digits in the integer. For example, if an integer is 932, the sum of all its digits is 14.	3	1	5M
3	Unit-II				
	a	i) Explain how you can pass and return objects using methods.	2	2	5M
		ii) What is the purpose of 'this' and 'static' keyword? Write a java program to explain this.	2	2	5M
	OR				
	b	i) Explain method overriding with example.	2	2	5M
ii) Define a recursive method for computing x raised to power y by doing repetitive multiplication where x and y are positive integer numbers. Define main to use above method.		2	2	5M	

4	Unit-III				
	a	i) Describe Inheritance and its type with suitable example.	2	3	5M
		ii) Declare an array reference variable for a two-dimensional array of int values, create a 4-by-5 int matrix, and assign it to the variable.	3	3	5M
	OR				
b	i) Differentiate between Interface and abstract class. When Interface is preferred over abstract class. Explain.	2	3	5M	
	ii) The abstract vegetable class has three subclasses named Potato, Brinjal and Tomato. Write a java prog. That demonstrates how to establish this class hierarchy. Declare one instance variable of type String that indicates the color of a vegetable. Create and display instances of these objects. Override the toString() method of object to return a string with the name of vegetable and its color.	3	3	5M	
5	Unit-IV				
	a	i) What is package? What are the benefits of package? Explain Java API packages.	2	4	5M
		ii) What is Stream Class? Explain input stream class and output stream class in details.	2	4	5M
	OR				
	b	i) What is an Exception? Explain different types of Exception?	2	4	5M
		ii) Consider following code fragment: try { statement 1; statement2; statement3; } catch (Exceptionl ex l) { } finally { statement4; } statement5;	3	4	5M
6	Unit-V				
	a	i) Write a java program to explain the use of File class and its methods.	2	5	5M
		ii) Explain comparable interface and cloneable with example.	2	5	5M
	OR				
b	i) Write a Java program that creates three threads. First thread displays — Good Morning! every one second, the second thread displays- Hello! every two seconds	2	5	5M	
	ii) Write a java program to implement join() method in multithreading.	3	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks